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Waste Reduction: Industry's Challenge

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ABSTRACT

Industry has a challenge to both society and its stockholders to minimize the generation of waste. There are both short and long term benefits which result in reduced costs and the potential for environmental problems. The 1984 Resource Conservation and Recovery Act Amendments provide increased incentives to minimize waste. However, the economics of good waste management practices will continue to drive the effort. Several examples within Du Pont are cited which demonstrate how advances in technology have permitted better control of the manufacturing process. The need for high standards for operations, housekeeping and training are also shown to be key elements in a successful waste reduction effort.

Du Pont's organizational structure is described as it relates to environmental policy and implementation of programs such as waste minimization. It incorporates engineering, marketing and research functions to identify the best methods to manage wastes. The government's obligation to design regulations which encourage reuse and recycle is also highlighted.

It's a pleasure to be here today and to have the opportunity to participate on this panel. The challenge industry faces in reducing waste centers upon optimizing, for the common good, the use of the limited resources that we traditionally devoted solely to the production of goods and services. On a May night in 1927—about halfway across the North Atlantic—I'm sure that optimal use of a limited resource, fuel, must have been uppermost in the mind of Charles Lindbergh. Like him, if we in industry are to accomplish our mission of reducing waste in the most effective manner, we must keep optimal use of resources continually in mind. This frames the principal challenge we in industry face as we investigate ways to reduce generation of waste.

The challenge to reduce the amount of waste generated is directed by the society in which we operate and by our stockholders. Industry's responsibility is to both and they are of equal importance.

Both sectors can benefit from waste reduction. Stockholders benefit through reduced production costs and a reduction of potential future liabilities. These increase both short and long term profits. In short, *waste minimization is simply good business.*

Society benefits in several ways. The potential for both short and long term environmental problems is reduced. And, we

are able to more efficiently use our limited natural resources. Finally, reduced waste will inevitably lead to lower cost for products, and thus, a higher standard of living for all Americans.

Considering these benefits, it should come as no surprise that waste minimization is not new to industry. However, to be candid, recent government regulations have added an incentive to industry's efforts in this area.

In 1984, a Federal law, the Resource Conservation and Recovery Act, established for the first time a national policy for waste management. The waste minimization section of this law can be compared to the energy conservation measures of the early 1970s. The severe limitations on land disposal practices increases the economic incentive for waste minimization. However, it is the considered opinion of most experts who are following the major developments in waste minimization policy, that in the long term it will not be the law, per se, that will fuel waste minimization efforts, but rather the basic economics of good waste management practices.

My intent here is to provide some history and background, to develop the criteria for an effective waste reduction program, describe how one company—Du Pont—approaches the effort, and, finally, cover some of the barriers which tend to inhibit this activity.

Reviewing waste management from a historical perspective, past minimization efforts by industry were driven primarily by economics. It is, after all, quite basic to expect the most efficient producer of a given product to have the best competitive position and to be the most profitable.

Continuing research efforts devoted to achieving less waste have been an ongoing activity in competitive industries such as the chemical industry. A classic example of this is illustrated by the manufacture of polyethylene. Developed about the time of World War II, this polymer found immediate application as an insulating material for electrical cables. At the time, manufacturing costs were high due to problems associated with a new process and product yields from the raw materials were only 10–20 percent. The selling price exceeded one dollar per pound.

Research to improve the manufacturing process led to significant yield improvements over the years. Today, unreacted raw material is recycled and overall yield of polyethylene has increased significantly. Yields typically exceed 95 percent.

Naturally, the expected happened. Waste was reduced; cost and, in turn, selling prices decreased. End uses multiplied and the benefits to society expanded. Today, uses of this material are vast and it sells for about 35 cents per pound. This equates to approximately 7 cents per pound in 1947 dollars, a reduction of roughly 93 percent over the past four decades.

This is the most effective method of waste management, i.e. improving the manufacturing process so that what was once waste is now productive end product.

Advances in technology leading to waste reduction have not, however, been limited to process improvements. Some of the most dramatic advances have been made, and continue to be made, in the systems used to control waste generation itself. Advances have been possible in this area primarily due to the use of improved instrument systems, among them computers.

While the use of large computer systems is costly and complex, these barriers are continually being reduced with the rapid advances being experienced in the electronics industry. Today, small microprocessors are relatively inexpensive, easy to install, and can be tailored to the needs of small operations. They continue to hold large promise in our efforts to reduce waste generation.

Computers enable us to sample conditions, compare the results with other parameters and make needed corrections with much greater sophistication than in the past. The net result is more precise control of the manufacturing process; and, therefore, reduced energy requirements, better raw material utilization, and better prod-

uct quality. All of these ultimately lend to more pounds of product per pound of ingredient and less waste generation.

A good example of this technology applied to a real world problem is provided by our LaPorte, Texas, facility. Installation of a microprocessor on the steam boilers at that site has enabled us to reduce the amount of wastewater generated by over 12 million gallons per year. The system is simple and reliable. Maintenance needs are minimal.

It is important to defuse the impression that waste reduction is solely a result of technological change. Equally as important are high operating standards, good training and good housekeeping practices. In this area, opportunities for waste reduction are numerous. They include careful cleaning of process equipment to reduce quantities of waste, improved techniques for loading and unloading of equipment to reduce contamination, and proper connecting and disconnecting of hoses and lines to reduce spills and prevent quality problems. These become accepted practices only if they are important to management.

Despite the obvious economic incentives, waste minimization programs do not develop automatically. A commitment from senior management is necessary. A policy must be developed; sensitivity and knowledge of the issue must exist at all levels of the organization. A program must be established by those responsible for each operation. Goals must be set so that performance can be measured. Finally, an audit system must be established to determine progress and, the progress must be communicated throughout the organization.

Within the Du Pont Company, waste minimization efforts are centralized in appropriate committees of the Executive Committee of the Board of Directors.

The two most prominent committees within Du Pont are the Environmental Quality Committee (EQC) and the Manufacturing Committee (MC). Corporate policy for safety, health and environmental affairs is established by the EQC and implementation of this policy is accomplished through the Manufacturing Committee. The latter is comprised of the heads of the manufacturing operation from each industrial department. A subcommittee of the manufacturing committee—the Hazardous Waste Advisory Committee (HWAC)—has been established for the purpose of coordinating activities associated with hazardous waste. Two principal objectives of this group are to: 1) to provide guidelines for waste reduction efforts and, 2) to insure that innovative approaches are communicated throughout the company. In addition, the HWAC is working to define corporate waste reduction goals and techniques for measuring and communicating progress toward those goals. This group has the backing and commitment of the highest levels of management within the company. This organizational commitment results in awareness in all the sectors of the company and highlights the importance of waste reduction.

We use our engineering, marketing, and research functions to identify the best methods to manage waste. Included are process modifications to improve yields, selection of new, different raw materials to reduce toxicity, improvement of waste recovery systems and, in some cases, development markets for by-product materials or materials that were once considered waste.

Let me just highlight three examples of how this can work:

1. At our Corpus Christi plant we manufacture "Freon" which generates significant quantities of anhydrous hydrogen chloride as a by-product. As a matter of fact, at full production capacity, it generates about 350 million pounds per year of this by-product. The conventional method for handling this material would be to quench it with water and dispose